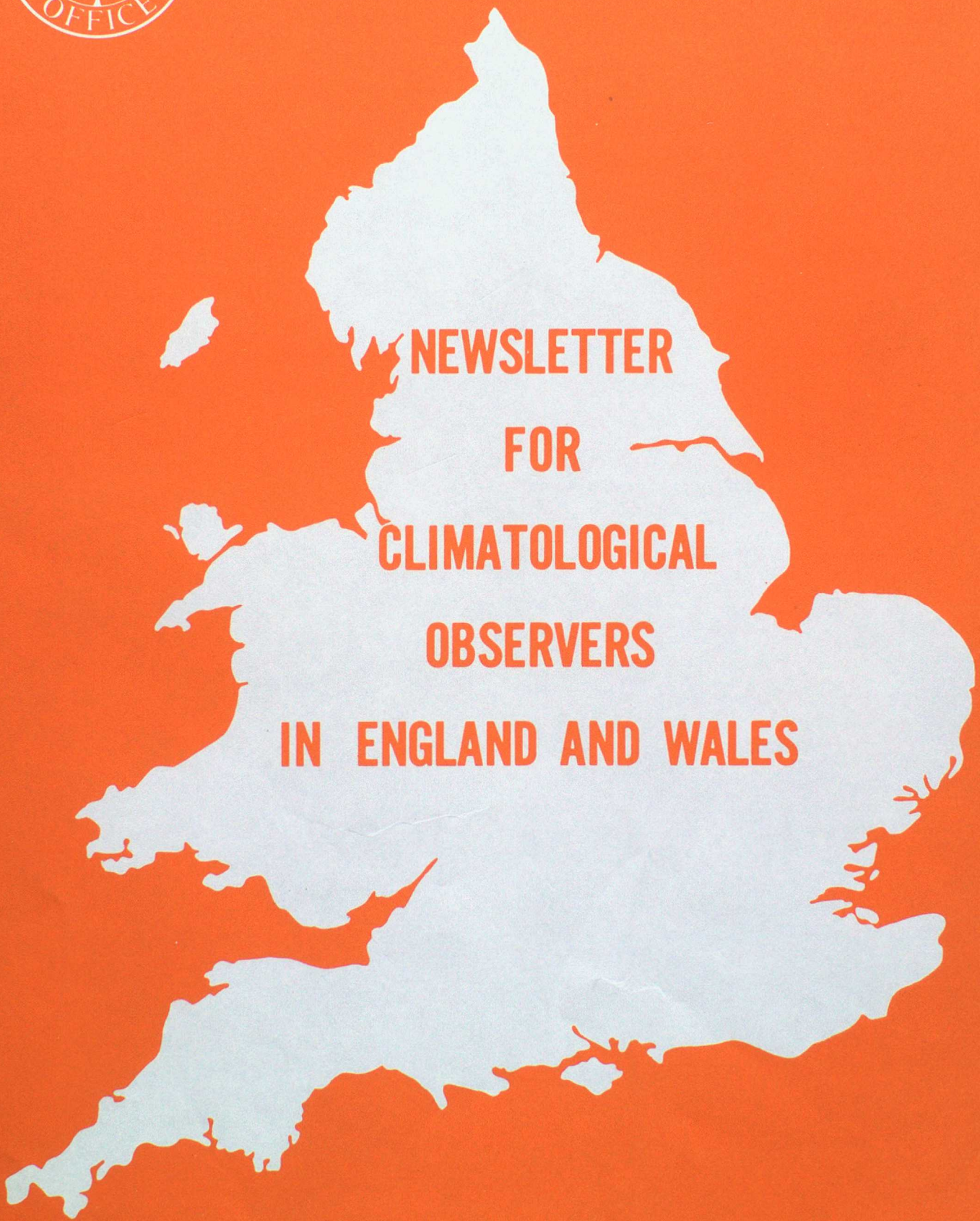
METEOROLOGICAL OFFICE



NEWSLETTER FOR CLIMATOLOGICAL OBSERVERS IN ENGLAND AND WALES

METEOROLOGICAL OFFICE

NEWSLETTER

FOR

CLIMATOLOGICAL OBERVERS

NO 18

JANUARY 1989

Produced by:

Met O 1
Observational Requirements and Practices Branch
Eastern Road
Bracknell
Berkshire
RG12 2UR

OBSERVERS NEWSLETTER - 18th Edition

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EDITORIAL

Welcome to the 18th edition of the Newsletter for climatological observers. Let me first of all wish you a belated Happy New Year. I hope you enjoyed yourselves during the Christmas and New Year festivities.

I wonder what type of weather you have encountered over the holiday period - I hope it wasn't too severe. If you are one of our new observers and you have had some frost and snow I hope that you coped with your weather observations. The Observers' Handbook is an invaluable aid during the winter months as it explains all the procedures you may need to use, for example:-

(i) What to do when the wet bulb temperature is below freezing- see page 120.

(ii) Snow and the grass minimum thermometer - see page 127.

(iii) How to obtain the liquid equivalent of solid precipitation - see pages 142-144.

However please do not hesitate to contact us if there is something you are unsure of, we will be pleased to help.

For many of you this will be your first Newsletter. We hope you will enjoy reading it and would welcome your comments on its contents and any ideas you may have for future topics which we could include.

This year many of our new stations will be visited for the first time by either myself, my colleague Elwyn Edwards or by an Officer from a nearby Met. Office. The main purpose of these visits is to give you an opportunity to discuss any problems you may have encountered and to check your instruments and their exposure. All our stations are visited at least once every three years. These visits also give us an opportunity of meeting you personally and so putting a face to a voice on the telephone or a name at the end of a letter. If we don't see you this year we look forward to meeting you at your next station visit. If you have applied for a place on one of the observer courses we are running this year then we will be pleased to see you when you visit the HQ at Bracknell.

R.Brooks

NEWS OF STATIONS

As you will see from the list of openings and closures below, 1988 was another very busy year for us. During the year 25 stations were recruited into the network which compared very favourably with the number of closures, which fortunately were limited to only three.

STATIONS CLOSING

HODDESDON (Herts) - Due to the impending closure of the Experimental Horticulture Station at Hoddesdon the Agro-Met Station established there closed at the end of December. This brings to an end a long period of co-operation which began back in 1958.

MARTLESHAM HEATH (Suffolk) - This station which was set up at the British Telecom Research Laboratories in 1984 closed during 1987.

ST. JOHNS, LAUNCESTON (Cornwall) - Run by the South West Water Authority this station joined the Climat Network back in 1972. Rainfall data however goes back to 1954 and is still forwarded to us on a monthly basis.

SITE CHANGES

SOUTHPORT (Lancs) - The Health Resort station at Southport was moved in May to a new location at the Greenbank High School for Girls.

SANTON DOWNHAM (Suffolk) - The climat/agro-met station at Santon Downham (Nr. Grimes Graves) moved to a new site in October approximately 1.5 miles south of the original site. This move, necessitated by the lack of observers at the old station, brings to an end a long record from this site - almost 30 years. The station is maintained by the Forestry Commission whose staff will now also carry out the daily readings at the new site in the grounds of the Forestry Commission Research Station at Santon Downham.

SOUTHGATE (Middx) - Due to persistent vandalism the climat station at Southgate (Oakwood Park) closed during 1987. This news was received with much regret as Oakwood Park was a long established station. Indeed 1988 would have been the 50th anniversary of the opening of the station. We were however pleased to learn that a new site at Capel Manor Horticultural & Environmental Centre at Waltham Cross had been identified to take over from the Oakwood Park station. We look forward to the opening of this new station, to be known as Waltham Cross, and hope it will be as successful as its predecessor.

TORQUAY (DEVON) - In November '88 the Health Resort station at Torquay was moved approximately 250 metres to the NW, into the grounds of Torre Abbey, to improve the security of the station.

NEWQUAY (Cornwall) - The Health Resort station at Newquay was recently moved a short distance from its previous location within Trenance Gardens due to redevelopment work.

NEW STATIONS

RHANDIRMWYN (Dyfed) - Observations from this new station began in February '88. The station is sited in the RSPB Gwenffrwd Reserve which is approximately 10 miles north of Llandovery.

SLIMBRIDGE (Gloucester) - Another station to open in February was Slimbridge. This station has been set up on land belonging to the Wildfowl Trust.

NEWPORT, CLEPPA PARK (Gwent) - In March '88 we were pleased to welcome back into the network a station set up and run by the Cleppa Park Field Research Station, Coedkernew. Previous co-operation was from 1952-77.

KEYWORTH (Notts) - This station which has been set up by Mr.J.D.Hodgson in the grounds of the British Geological Survey opened in May '88.

WESTLETON (Suffolk) - Also opening in May was the station established on the RSPB Minsmere Reserve near Westleton.

LOWER WILLINGDON (East Sussex) - Observations from this new staion near Eastbourne began in July '88. The station has been set up by Mr.G.S.Wrapson at the Willingdon County Primary School.

LLYSDINAM (Powys) - A climat station at the Llysdinam Field Centre, Newbridge-on-Wye has been set up and data from it received since July'88. Previously only rainfall data (since 1964) was available from this station.

WINTERBOURNE (West Midlands) - This station is run and maintained by the University of Birmingham. We were pleased to accept their offer of co-operation, which officially began in July.

ROADFORD DAM (Devon) - Another station to join in July was Roadford Dam situated approximately 6 miles Northeast of Launceston. This station is run by the South West Water Authority.

FONTMELL MAGNA (Dorset) - This station has been set up with the co-operation of Mr & Mrs Westgate at their home at Fontmell Magna - approximately 4 miles south of Shaftesbury. Observations began in July '88.

ARTHOG (Gwynedd) - Observations from Arthog began in August 1988. This station replaced the proposed station at Islawdref 3 miles to east. The station is set up on land belonging to Mr & Mrs White and is run by Mr R. Howard assisted by Mr & Mrs White.

BARBOURNE (Worcs) - A private station established by Mr.P.J.Damari. Observations began in September '88.

NANTWICH (Cheshire) - Rainfall data from this station set up by the Cheshire College of Agriculture, Reaseheath goes back to 1895. Climatological observations began in September '88.

EDGE (Shropshire) - Situated approximately 6 miles SW of Shrewsbury this station, which opened in October '88, is run by Mr.M.G.Tudor.

SARON (Dyfed) - Another station to open in October is Saron which is run by Mr.M.Stedham and is situated approximately 12 miles North of Carmarthen.

BRENT PELHAM (Herts) - Observations from Brent Pelham began in November 1988. This station has been set up at the home of Mr & Mrs Clarke.

TREDEGAR (Gwent) - Climat data from a weather station set up at the Bryn Bach Park near Tredegar has been forwarded to us since November '88.

DINORWIC (Gwynedd) - This station in North Wales has been set up at the Blue Peris Mountain Centre, Dinowic and is situated approximately 7 miles east of Caernavon. Observations began in November '88.

LAKE VYRNWY (Powys) - This combined Synoptic Automatic Weather Station (SAWS) and climatological station is situated 1 mile SW of Llanwddyn. The SAWS station is not operational at the moment because of communications problems. However climat observations have been made at the site since November '88 by the observer Mr.M.Walker, the local RSPB Warden.

PENNERLEY (Shropshire) - situated approximately 12 miles southwest of Shewsbury on the Stiperstones at 357m (1171 ft) above mean sea level. This station has been in operation since November '88 and is run by Mr N.S.Evans.

CROSSWAY (Gwent) - This station opened in December '88 and has been established at the Hilston Park Centre, Crossway - approximately 5 miles NW of Monmouth.

LLANISHEN (GWENT) - Another station in Gwent to open in December was Llanishen. This station is run by Mr G.C.Pugh on his farm - situated approximately 7 miles NNW of Chepstow.

STATIONS OPENING SOON

NEWTOWN (Powys) - A climatological weather station is being established by the Agricultural Dept, Montgomery College of Further Education at Fronlas Farm, Newtown. The planned opening date is 1st January '89.

ST. IVES (Cornwall) - A Health Resort station is being set up at the Coastguard Lookout at St.Ives.

FELLSIDE (Cumbria) - This planned station is being established at the Fellside Outdoor Education Centre Nr. Caldbeck. The station will be 925 feet above sea level and is situated on the northern slopes of the northern most part of the Lake District hills.

ADMINISTRATIVE CHANGE

MINEHEAD (Somerset) - Up until December '88 the Health Resort station at Minehead was also an Auxiliary reporting station sending in real time observations on a regular basis. However following the move of the main observer, Mr A Ozanne, to Tivington, approx 3 miles to the west of the Minehead station, Minehead will now return to the usual Health Resort observing programme. Mr Ozanne is now running a new Auxiliary station at his home at Tivington but he will also continue to assist with the observing and running of the Minehead station.

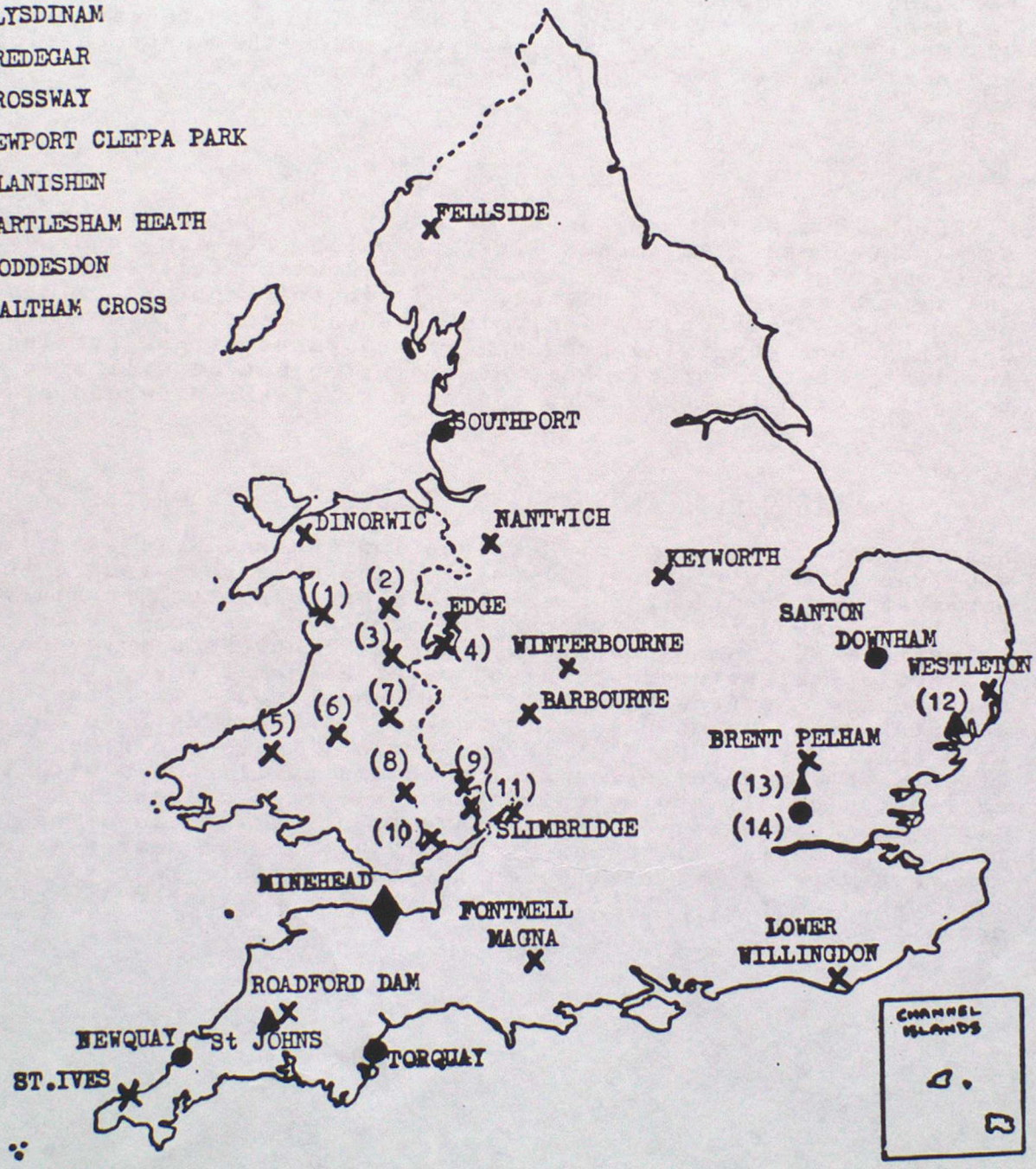
MICRO-COMPUTERS AND THE CLIMATOLOGICAL OBSERVER

Here in the Climatological Data section, we are well aware that a substantial number of our Climatological Observers record their observations for their own use on a micro-computer, possibly a BBC model B, Commodore 64, Amstrad CPC or PCW or maybe a fully IBM compatible PC. Some observers, indeed, find the completion of climatological returns by ink on paper as something of an anachronism. A growing number would undoubtedly wish their micro-computer could be used more in forwarding their data to the Central Data Bank. Unfortunately, things are not that simple, despite all efforts on standardization many problems still remain with the collection of climatological data by electronic means. However our Climatological Data section is investigating the use of new data transcription facilities and probably before the next Newsletter, you may receive a questionnaire seeking to ascertain your views and willingness (or otherwise) to be involved in greater use of computers.

THE MAP BELOW SHOWS THE STATIONS WHICH HAVE OPENED OR CLOSED SINCE THE LAST NEWSLETTER WAS ISSUED

Key to numbered stations

(1) = ARTHOG
(2) = LAKE VYRNWY
(3) = NEWTOWN
(4) = PENNERLEY
(5) = SARON
(6) = RHANDIRMWYN
(7) = LLYSDINAM
(8) = TREDEGAR
(9) = CROSSWAY
(10) = NEWPORT CLEPPA PARK
(11) = LLANISHEN
(12) = MARTLESHAM HEATH
(13) = HODDESDON
(14) = WALTHAM CROSS



✕ = Station opened or planned
▲ = Station closed
● = Site change
◆ = Administrative change

AWARDS TO OBSERVERS IN 1988

An award was made this year to MISS B.J.BALMAIN the observer at Newton Rigg (Cumbria) in recognition of the high standards she has maintained in her meteorological routine over the past 25 years. Our congratulations go to Miss Balmain on reaching this notable milestone.

Our congratulations go also to the following 6 observers who received a book award in recognition of the high standards they have maintained at their stations over the past 15 years.

MR M. BEADLE	-	HAZELRIGG (LANCS)
MR A. BIGNALL	-	EDENBRIDGE (KENT)
MR R.A.GARRAD	-	HASTINGS (E. SUSSEX)
MRS E.M.GILBERT	-	MEPAL (CAMB)
MR M.W.HUXLEY	-	LONG ASHTON (AVON)
MR J.R.NEWSAM	-	LOGGERHEADS (CLWYD)

Last year you will recall we introduced a new award to be given to the ten observers who have provided the best climatological returns over the preceeding twelve months. We discovered last year that narrowing down the list of names to ten was a very difficult task. Choosing the winners for 1988 gave us an equally perplexing time. However the ten recipients of the award for 1988 are as follows:

MISS L. HAYDON	-	ALICE HOLD LODGE (SURREY)
MR S.E.H. MARTIN	-	ASHOVER (DERBYS)
MR E.O. JONES	-	BALA (GWYNEDD)
MR T.NAISH	-	BEAMINSTER (DORSET)
MRS S ASQUITH	-	BIDSTON (MERSEYSIDE)
MR J.G.HILTON	-	MORLEY ST.BOTOLPH (NORFOLK)
MR P.L. CUNNINGTON	-	NESS GARDENS (NORFOLK)
MR J.P. MILLET	-	ROSEWARNE (CORNWALL)
MR D.C. SMITH	-	TOWY CASTLE (DYFED)
MR I.H. FINDLAY	-	WIDDYBANK FELL (DURHAM)

Royal Meteorological Society
Field Study Courses
on Weather

COURSES IN 1989

Weather Under Sail
Aboard the "Hoshi" **6-13 May 1989** **£195 approx.**
Aboard the "Island Renown" **2-9 September 1989** **£255 approx.**
Directed by Mr. Richard Ebling, Southampton Weather Centre
Run in conjunction with the Island Cruising Club
Sailing from Salcombe in Devon the course takes place either aboard the Club's 86ft classic Edwardian schooner "Hoshi" – which has berths for 9 plus Course Leader, Skipper, Mate and also a full time cook; or aboard "Island Renown" – a 45ft GibSea 442 – with berths for 7 plus Course Leader, Skipper and cook/mate. The destination will be the waters of the English Channel, and you will learn not only about meteorology afloat, but also (in the Spring course) about sailing a gaff rigged schooner – from measuring weather elements to influencing the ship's course on the basis of your forecast.

Understanding Weather **4-11 August 1989** **£165**
Malham Tarn Field Centre, Yorkshire
Directed by Dr. Keith Weston, University of Edinburgh
and Dr. David Warren, British Antarctic Survey
A course in which you are immersed in the weather and all things meteorological in beautiful surroundings 1300ft up in the Yorkshire Dales. A full week's programme of talks, outdoor work and films includes learning about weather satellites, a forecasting competition and the launching and tracking of hydrogen-filled balloons. Useful for GCSE teachers and students.

Mountain Weather **13-18 August 1989** **£140**
Drapers' Field Centre, Betws-y-Coed, Gwynedd
Directed by Mr. Terry Spalding and Mr. Rodney Blackall, Meteorological Office
This is a course for all who like to roam in the hills. It consists of some lectures, do-it-yourself forecasting and field work amidst the beautiful scenery of Snowdonia.

Weather Science and Weather Forecasting **23-30 August 1989** **residential – £171** **non-residential – £103**
The Leonard Wills Field Centre, Nettlecombe Court, Somerset
Directed by Dr. Bob Riddaway and Dr. Geoff Jenkins, Meteorological Office
Would you enjoy learning how to understand weather charts and make your own local forecast? – to track weather balloons, to measure high altitude winds? – and to be involved in lots of other weather activities, all in the informal atmosphere of a beautiful old country house in the Exmoor National Park? Then this is for you. Useful for GCSE teachers and students.

Weather and Bird Migration **10-15 September 1989** **£105**
Gibraltar Point Field Station, Skegness, Lincolnshire
Directed by Malcolm Walker and Al Venables, University of Wales College of Cardiff
This course is intended for bird-watchers who wish to study the ways in which migrations, populations and flight patterns of birds depend upon weather and climate. Much of each day is spent in the field, and the aim is chiefly to relate the species seen, and their numbers, to the current weather situation.

Weekend Courses:
Waders and the Weather **5-8 May 1989** **£88**
Castle Head Field Centre, Grange-over-Sands, Cumbria
Directed by Malcolm Walker and Al Venables, University of Wales College of Cardiff
This course is for bird watchers who wish to learn more about the wading birds which pass through Britain in spring, and the influence of the weather on their migrations.

Understanding Mountain Weather **24-25 June**
Directed by Mr. D.J. George, formerly Cardiff Weather Centre,
in conjunction with the Sports Council
Weekend courses for those who go into the mountains for work or leisure, including leaders of parties and those working towards Mountain Leadership qualifications, Duke of Edinburgh awards, and GCSE Meteorology. Includes one field trip and informal lectures.
Bookings (including deposit of £30, deducted from course fee of £79) to:
National Centre for Mountain Activities, Plas-y-Brenin, Capel Curig, Gwynedd

For further details of the above courses, please write, stating your specific interest, to:
The Executive Secretary, Royal Meteorological Society,
James Glaisher House, Grenville Place, Bracknell, Berkshire RG12 1BX

CO-OPERATING OBSERVER COURSES

Four courses are to be held in 1989 at the Meteorological Office College Shinfield Park, Reading. The College is fully residential with free accommodation and food provided. Travelling expenses are also reimbursed. The dates of the courses are:-

CO2 27 Feb - 3 March
CO3 12 - 16 June
CO4 26 - 30 June
CO1 4 - 8 Sept

The last two courses CO4 and CO1 will be most suitable for Agro-Met observers.

The following article is an extract taken from 'Notes on Weather Observing' produced by the Met Office at Edinburgh.

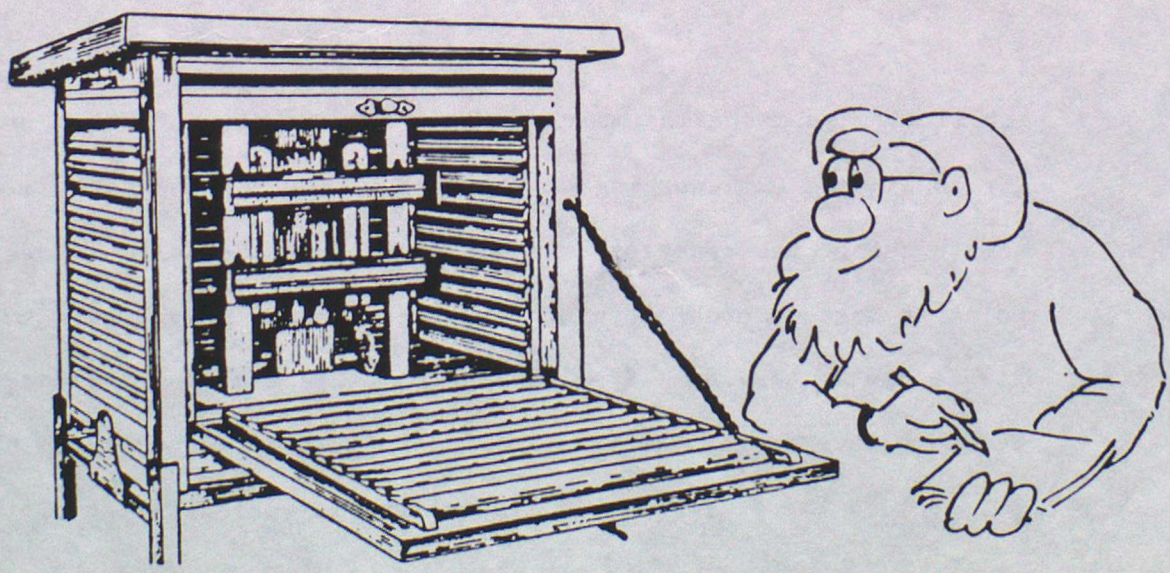
TEMPERATURE 1

What we are trying to measure is the temperature of the air. To do this accurately we need to shield the thermometer from any extraneous source of heat which would cause it to give an incorrect reading. The main such source is direct or indirect sunlight which can cause a thermometer to read tens of degrees too high.

One of the most obvious ways of shielding a thermometer is to mount it in a box. Provide plenty of holes for ventilation and paint the box white to reflect sun light and ..... you have the familiar 'stevenson' screen.

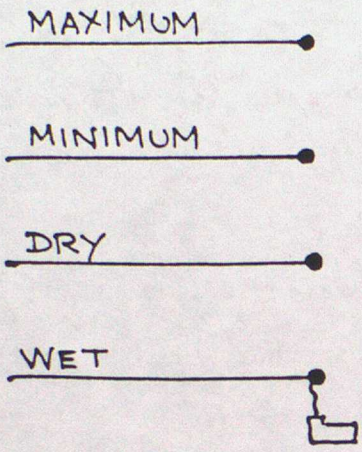
The screen itself is mounted on a metal or wooden frame. As there can often be very large differences in temperature in the first few feet above the ground - especially on warm days and cold nights - all thermometer screens must be at the same height above the ground. If they were all at different heights, it would not be possible to compare temperatures from different sites.

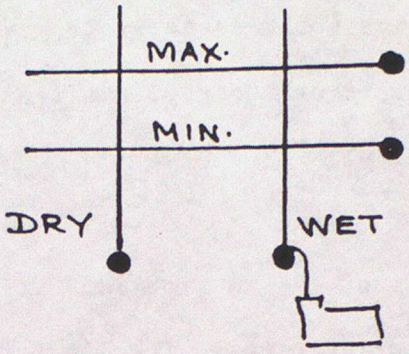
Different ground surfaces can also affect the temperature by absorbing heat at different rates, so a standard ground surface is also required. Grass has long been accepted as a cheap, eaily available surface.



TEMPERATURE 2

Inside the screen are 4 thermometers in one of two different arrangements.





The DRY BULB measures the instantaneous air temperature and is continually changing as the air temperature changes.

The WET BULB is an identical thermometer with a piece of muslin wrapped round the bulb. This is kept moist by water travelling up the wick from the reservoir.

Along with the dry bulb, this thermometer enables us to calculate the amount of moisture in the air. It does this in the following manner.

Air flowing past the thermometer evaporates moisture from the muslin in the same way as it does with washing on the line. However the continuing supply of moisture from the reservoir via the wick keeps themuslin moist. The important point is that in order to evaporate (i.e. change from liquid to vapour) the liquid has to take heat from its surroundings i.e. the thermometer bulb. The WET BULB thermometer therefore registers a lower temperature than its partner the DRY BULB. The difference in temperature is an indication of the amount of water

vapour in the air. If the air is dry the difference is large, if the air is moist, the difference is small.

In fog or drizzle no evaporation takes place so the wet bulb reads the same as the dry bulb.

For all practical purposes it can be assumed that the wet bulb can never read higher than the dry bulb.

To enable the wet bulb to work correctly, there must be an adequate supply of water from the reservoir and the wick must be clean.

Below zero temperatures

If the temperature is below zero then the water in the muslin may freeze. The wet bulb (now called an ice bulb) will still work as the ice will evaporate in dry air. The main problem is that the muslin will then become dry as no water can travel up from the reservoir.

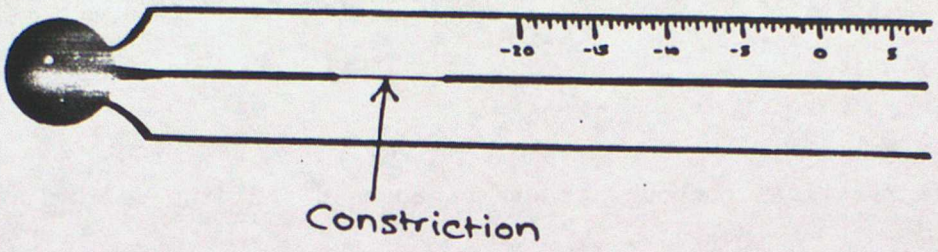
The only way to be sure of a correct reading in sub-zero temperatures is to wet the muslin with water about an hour before the 0900 observation (to give the water time to freeze). If this is not practicable, the best advice we can give you is:-

If there is a difference between the dry and wet bulb, then the wet bulb is probably working so take the reading as normal.

If there is no difference between the dry and wet bulb, then the muslin is probably dry, so leave the wet bulb entry blank.

(Sketches by Norman Jenkins Met Office Edinburgh)

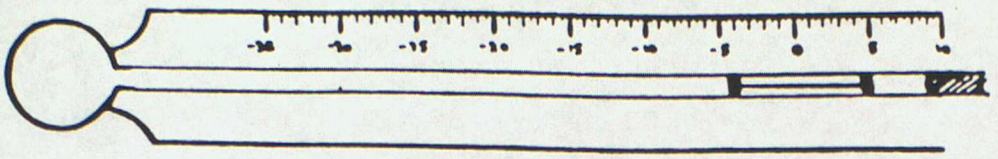
MAXIMUM THERMOMETER



As its name suggest the maximum thermometer indicates the highest temperature recorded between the time it is set and the time it is read. In many respects it is of the same construction as the Dry Bulb. The one important difference is that some 6 cm above the bulb, the tube in which the mercury moves has been pinched off to form a very narrow neck or constriction. As the temperature rises the mercury is forced past the constriction and rises up the thermometer in the usual way. However when the temperature falls, there is no force to push the mercury back past the constriction so it remains in position showing the highest temperature reached. Incidentally, the mercury between the bulb and the constriction <u>can</u> contract back into the bulb which is why there is sometimes a gap in the mercury at this point.

After reading, the thermometer is reset by 'swinging' it and so forcing the mercury back past the constriction.

MINIMUM THERMOMETER



This thermometer measures the minimum temperature between the time it is set and the time it is read. Unlike the DRY, WET and MAXIMUM thermometers which contain mercury, this thermometer contains colourless alcohol. Floating in the alcohol is a lightweight index shaped like a dumbell. The thermometer is set by tipping it, bulb end up, so that the index floats down to the end of the alcohol column. As the temperature falls, the alcohol contracts back towards the bulb and the index is dragged along with it. When the temperature rises, the alcolhol flows past the index leaving it to indicate the lowest temperature reached.

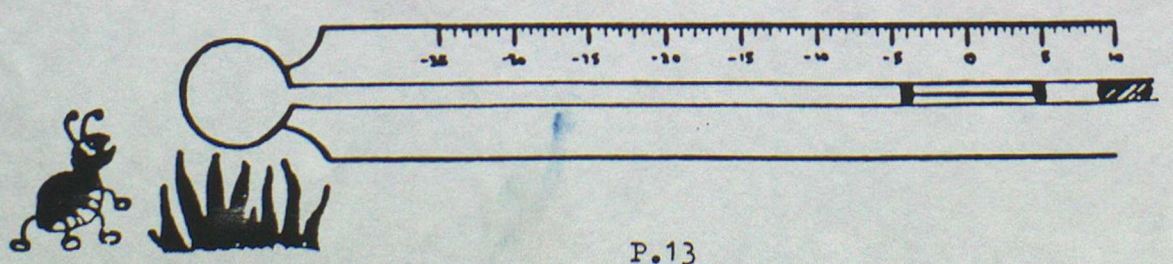
READ THE RIGHT HAND END OF THE INDEX FOR THE RIGHT ANSWER

In addition to the thermometers in the screen, some stations have a GRASS MINIMUM THERMOMETER. This allows us to measure the (quite often large) differences between the minimum air temperature and the minimum ground temperature. The thermometer is of the same type as the air minimum but, because it is often exposed to direct sunlight, it is fitted with a black radiation shield on the end away from the bulb. This is to help prevent bubbles forming in the alcohol due to the heat of the sun.

One way of minimising the problem of bubbling is to keep the thermometer in the screen during the day and only put it out overnight. If you do this please remember to tell us by writing the time that the thermometer is put out at the head of the appropriate column on your monthly return.

The Grass minimum should be mounted over short grass with its bulb just touching the blades.

When the ground is snow covered, the thermometer should be mounted on top of the snow.

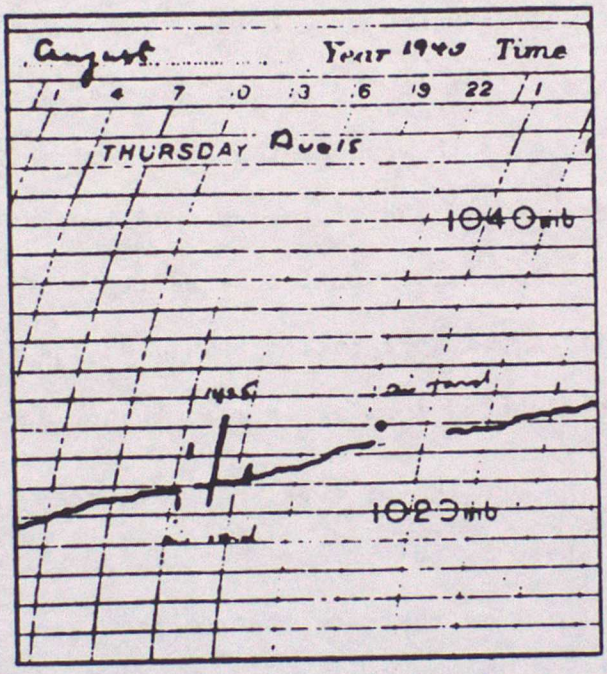


A note from the Archivist

I expect some of you may wonder what happens to all your forms and charts when they are sent to Archives. Well they don't just collect dust, or get wet, on the 4500 metres of shelving at Bracknell. Sometimes they are used for research.

Recently, an aviation historian wrote to us, asking about the weather on 15 August 1940. This was the date of the first large-scale air raid of the Battle of Britain on the north of England. To get an idea of the situation, the charts, Registers and autographic records for the time were consulted. The Daily Register for Driffield mentions 'air mark' and the barograph has a 'time mark' made by the bomb blast just after 1300 hours. It is interesting to note that there was a (regular) time mark at 1425 - what devotion to duty!

Incidentally, it was quite a pleasant summer day as far as the weather was concerned, although the observer at Driffield probably felt differently about it.



Driffield barogram time-marked by bomb blast

Mick Wood
Officer i/c Archives

HQ'S NEWS

The Central Forecasting Office (C.F.O) was completely refurbished during the latter part of 1987 and early 1988 to accommodate the transfer of the Heathrow Airport Forecasting Office to the C.F.O. The new Office was reoccupied in February closely followed by the arrival of Heathrow Staff in March.

A new ETA 10 supercomputer has been purchased by the Meteorological Office and has been successfully installed in a new computer room at HQ. The new computer, which can perform over 3000 million operations each second, is currently undergoing trials.

Visitors to the HQ last year could not have helped but notice the considerable activities taking place on the outside walls of the main building. The refacing of the exterior walls still continues but work should be completed in the next few months.

STAFF NEWS

John Gloster the former head of Met O 1e has now moved on and will be replaced by Roger Stobbs in the next few weeks.

Elwyn Edwards retires later this year. Elwyn has had a varied career in the Met Office doing many different jobs both home and abroad. As a member of the Mobile Met Unit he has worked in Europe the Mediterranean and the South Atlantic.

BRACKNELL HEADQUARTERS BRANCHES

Branch: Met O 1 - Observational Requirements and Practices

Section: e

Function:
- Liaison with observers.
- Queries on running a meteorological station
- Supplies of stationery, forms, equipment, pocket registers.
- Site changes

Staff:
Mr Elwyn Edwards Ext 2727
Mr Richard Brooks Ext 2266

Address:
Met O 1e
Eastern Road
Bracknell
Berkshire
RG12 2UR

Telephone: Bracknell 420242 plus extension.

Branch: Met O 3 - Advisory Services

Section: a

Function: Collection and Quality Control of Climatological Data

Staff: Mr J Holton plus 3 assistants -

Jan Lewandoski	Ext 2241
Walter Shackleton	Ext 2248
John Spafford	Ext 2409

Address:
Met O 3a
London Road
Bracknell
Berkshire
RG12 2SZ

Telephone: Bracknell 420242 extension 2271.

Other Useful Sections

Climatological Enquiries - Met O 3b
Tel: Bracknell 420242
extensions 2278 or 2279 for UK
extension 2267 for Overseas.

Weather in the United Kingdom
September 1987 to September 1988

September 1987
The month began with thundery rain moving slowly eastwards on the 1st, bringing heavy rain to counties to the north and west of London during the night with reports of flooding. It remained unsettled with showers or longer periods of rain at times, becoming widespread on the 11th and 12th as the remnant of tropical storm Cindy crossed central areas of England and Wales. It became dry in central and southern areas over the next six days, but later on the 16th and early on the 17th wet weather came to parts of England and Wales. After a dry day in all areas on the 18th it was mostly dry on the 20th, but on the next two days it was wet in the west. Apart from a few showers, mainly in northern England, the rest of the month was dry, though cool.

October 1987
After a dry start to the month the weather became changeable with a great deal of rainfall in the first half of the month, bringing widespread flooding to the south and east. The storm on the 16th brought violent-storm-force winds and heavy rain to southern England. On the night of the 17th/18th there were strong winds and widespread flooding in western and northern areas of Wales; substantial amounts of rain fell in western parts of Wales. Flooding was worst around Carmarthen and the areas of the rivers Teifi and Tywi. It remained unsettled for the last week or so, with some fine and sunny interludes, but gradually becoming cooler.

November 1987
The month started generally dry except in Orkney and Shetland, but during the first week unsettled weather returned to all parts. The south-eastward passage of the depression across western areas of the United Kingdom on the 8th brought heavy rain to some places. After a brief drier interval, there was a change to an unsettled westerly airstream on the 10th, with rain or showers in most areas although with some drier spells, until the 25th, when brighter weather came to the north-west, spreading to the south-east by the 27th. Further rain reached all areas except south-eastern England on the 29th, with substantial falls in Devon, Cornwall and Dyfed. The 30th was a dry day except in the Midlands and north-east England.

December 1987
The month began unsettled in south-western parts of England and Wales with sleet or snow on hills. Some outbreaks of light snow occurred in eastern and south-eastern England on the 8th and 9th. There was rain in eastern England on the 10th and in Cornwall on the 11th. Milder conditions spread to south-west England on the 14th and continued northwards to most of England and Wales by the morning of the 16th with widespread rainfall. On the 16th and 17th there was rain in all areas. A showery air flow followed, but many parts of eastern and central England were dry. On the 19th there were some substantial falls in North Wales with further rain affecting mainly northern areas on the following two days, but south-east England remained dry. From the 22nd over the next

few days it remained very mild with rainfall mainly in western areas. Substantial falls of rain occurred in between the 26th and the morning of the 30th.

January 1988
The month started with fronts bringing heavy rain and some exceptionally mild conditions for England, Wales and Northern Ireland. By the 4th rain moved north-east across England and Wales, with some fairly heavy snow on the Pennines. Showers were widespread on the 10th, with sleet and snow over higher ground. On the 14th there was a little sunshine nearly everywhere; many eastern and south-eastern areas stayed dull and cold on the 15th. Heavy rain fell on north-western parts of the United Kingdom on the 17th, followed by a cold day on the 18th. By the 20th and 21st it was very sunny. The month ended with further heavy rain.

February 1988
February was a month of contrasting weather. The month began generally unsettled, with showers or longer periods of rain. Snow, sleet or hail occurred widely, especially in northern and western areas. On the 9th strong winds in Devon and Cornwall brought down trees and disrupted traffic. North-west England suffered the worst damage, however, with structural damage to buildings, including the roof of the Town Hall at Bury, Greater Manchester and disruption of road and rail traffic; a bus was blown over at Chesterfield, Derbyshire and rail services between London and Glasgow were delayed after strong winds damaged electrical equipment. The wind slowly moderated on the 10th. It remained unsettled until the 15th when high pressure brought more settled conditions to southern areas. Thunder was widely reported, notably on the 1st, 9th and 13th.

March 1988
March was the wettest in several years in England and Wales. The month started with sleet and snow showers in many places and continued for the next few days with rain or showers, and some snow on the 4th. It remained unsettled for most of the month. The 15th was a windy day in many places especially in the south. The 20th started bright but cloud and rain spread northwards during the day. Brighter showery weather spread to all but the south-east of England during the 28th. During the closing days of the month, there was a good deal of sunshine with some scattered showers in England and Wales. On the 24th there were widespread reports of thunder from southern Scotland to East Anglia; lightning caused structural damage to property at Donington, approximately 13 km south-west of Kirton, Lincolnshire. Hail was reported frequently during the month, widespread at times.

April 1988
April was the fifth month in succession in which temperatures were above normal nearly everywhere. The weather was changeable with warm and cold spells: it was rather wet in northern areas but generally rather dry in southern areas, and with below average sunshine in most parts.
Sheffield, Weston Park reported the lowest rainfall amount since 1981 and the dullest April since 1978. During the 8th, arctic air behind a cold front turned the rain to snow later in the day in many parts of northern England and, as the front moved further south-westwards, much

of eastern Wales and central and south-eastern England had a period of snow early on the 9th. Thunder was reported over the Midlands, notably over Nottinghamshire and Derbyshire, on the 3rd, over a wide area of eastern and southern England on the 18th, and much of central southern and south-west England on the 27th. Hail was widespread in the north Midlands and in parts of southern England from Kent to Dorset on the 27th.

May 1988

May was quite a warm, sunny month everywhere, with about average rainfall, except for the east coast which was cloudy and cool. The month began with periods of rain, followed by showers, some of them heavy and thundery in the north. On the 5th more settled weather returned, but with some showers in South Wales and south-west England. Early on the 8th warm, moist air from the Continent brought thundery rain to the south-east, with severe thunderstorms in the Thames Valley later. Southern and eastern England had a cool, cloudy day on the 9th and 10th whereas in the west it was drier and sunnier. After a period of rain on the 11th and 12th increasing pressure gave most places warm, sunny days from the 13th to 15th; on the 14th the temperature at Littlehampton, West Sussex reached 25 °C, but the wind kept the east coast cooler. From the 16th colder air with rain moved southwards followed by brighter, showery weather. After clear skies and cold nights with quite a widespread frost on the 20th and 21st, belts of rain, with a bright day in between, crossed all areas on the 23rd and 25th. The month ended with blustery showers.

June 1988

June was a generally dry month with about average sunshine. Temperatures were slightly above normal, except in south-east England and East Anglia. Most places had some rain during the first and last weeks of the month, but the month was rather dry in England and Wales as a whole, but very dry in parts of the south and south-east; Worthing, West Sussex had as little as 9 mm of rain during the whole month. Thundery showers over East Anglia and southern England on the 20th gave prolonged and heavy rain for much of the evening at Chelmsford, Essex. The 23rd was the warmest day of the year so far and there was a good deal of sunshine and dry weather with the return of high pressure, the temperature at Bournemouth, Dorset reaching 27.5 °C. The 24th and 25th were largely dry and relatively sunny days, but showers over the Pennines on the 25th turned to more general and heavy rain for a time. This rain spread to western England on the 26th ending two weeks of dry weather. For the closing days of the month the weather turned showery with some thunder in places but there was still some sunshine.

July 1988

July was a particularly wet month in many areas; over England it was the wettest July since 1939 and over Wales since 1960. Between the 18th and 20th it was generally dry, but with some rain in western parts of Wales. The weather continued unsettled for the rest of the month with some particularly heavy rainfall in a few western areas. Most of the month's major events were disrupted including the Tennis Championships at Wimbledon which were virtually washed out on the 3rd and the Royal Agricultural Show at Stoneleigh, Warwickshire, where the show ring

became waterlogged after heavy rain on the 4th. Thunderstorms occurred widely between the 1st and 8th, mainly over England. There were further outbreaks from time to time, mostly scattered, but widespread over southern England on the 26th. Sheffield, Weston Park, South Yorkshire reported the lowest July maximum temperature since 1965, 21.5 °C and Halesowen, West Midlands the coolest July since 1965 with a maximum of 21.0 °C. The highest maximum of 20.5 °C at Ashover, Derbyshire was the lowest July maximum since records began there in 1967. Hampstead, Greater London reported that although it was only the coldest July since 1980, the highest maximum, 21.4 °C, was the lowest since records began at the station in 1909. Some long-standing rainfall records were broken: it was the wettest July over England since 1936, over Wales since 1939. Watnall, Nottinghamshire had the wettest July for 15 years and Widdybank Fell, Cumbria the wettest since records began there in 1968. Coventry School (Bablake), Warwickshire reported the wettest July since 1958, Bidston, Merseyside the wettest since 1957 and Morecambe, Lancashire the wettest since 1909. At Halesowen, West Midlands July was the second wettest in almost 50 years, only 1957 being wetter. Sheffield, Weston Park, South Yorkshire reported the wettest July since 1973, and the highest number of July raindays in a record reaching back to 1882. Aspatria, Cumbria with 30 raindays equalled the record, held by Stornoway, of the greatest number of raindays in a month. It was the third dullest July at North Wyke, Devon since 1959.

August 1988

Rain fell in most western and central areas of the United Kingdom on the 10th. It was very wet on the 12th in some parts of northern England. Wales and the coastal areas of north-west England had a wet day on the 18th. The unsettled weather persisted for the rest of the month, with rain falling on almost every day in some western areas of England, notably Devon, Cornwall, Avon and part of Wiltshire. There were further large falls in Snowdonia and Cumbria on the 29th and in many parts of England on the 30th, but Norfolk, Suffolk and parts of the Thames Estuary stayed mostly dry. There was further heavy rain in parts of South Wales, Cornwall, Devon, Dorset and Hampshire on the 31st. Thunderstorms occurred on the coast of north-east England on the 1st, and across central and eastern parts of England on the 2nd and scattered thunderstorms occurred in east and south-east England on the 28th.

September 1988

The month started showery in many areas, becoming dry and warm generally by the 5th. Southern areas remained dry on the 6th but there was heavy rain in the north. It was sunny in many places on the 7th and 8th, but with some showers and thundery outbreaks, and quite warm on the 8th and 9th in south-east England. However, rain in the north and west spread southwards to reach all areas by dawn on the 11th. The showery weather continued on the 13th and 14th; apart from some rain on the 20th in north-west England, a period of mainly dry weather with a fair amount of sunshine followed. The rest of the month was somewhat less settled, with some wet days. Widespread rain on the 24th occurred from the Midlands southwards, with the largest falls from South Wales to the Thames Estuary. A mostly fine day on the 25th was followed by very wet days on the 26th and 27th. A few showers occurred in the last day or two, but most places remained dry and sunny.